Corona Wind Velocity: Parametric Approach

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Summary

The paper presents briefly a laser Doppler Velocimetry that was designed and constructed to measure the corona wind velocity. It details the link of the discharge system geometrical parameters with the system variables such as, the applied voltage, the ion mobility, with the discharge medium characteristic such as permittivity and mass density, along with the measuring point position within the discharge system. A point to plane testing discharge system was constructed allowing the flow of air to pass, circulate and return to its initial status, when corona is initiated by the alternating applied voltage on the stressed electrode. Based on the experimental results, dimensional analysis is used to form a mathematical relation that estimates the corona wind velocity as function of the system geometrical parameters, the system electrical variables, and the discharge medium physical parameters. The developed relation was found to be sound when used within the range of the constructed geometrical system parameters. Research work is undergoing considering broader parameter ranges and for other electrode systems in order to investigate the validity and the generalization of the deduced relation